

**GWOU ADMINISTRATIVE RECORD**  
**SECTION TITLE:**  
**GW-300-303-1.21**

## DOCUMENT CONTROL SYSTEM - CORRESPONDENCE FILE

**WELDON SPRING SITE REMEDIAL ACTION PROJECT**  
**MK-FERGUSON CO., INC. WO 3589 (636) 441-8086**  
 7295 Highway 94 South  
 St. Charles, MO 63304

Document Number: **94355**

Document Type: **MO-SMSW-FILE**

Originators DCN: \_\_\_\_\_

►SUBJECT **COST ESTIMATES FOR FINAL ALTERNATIVES PRESENTED IN THE SUPPORTING EVALUATION FOR THE PROPOSED PLAN FOR THE FINAL REMEDIAL ACTION FOR THE GWOU.**

►AUTHOR **CATO, REBECCA** ►TO **FILE** ►DATE \_\_\_\_\_

►WBS/SUBJECT CODE **85080**

REFERENCED DOCUMENT(S) \_\_\_\_\_

**ACTION ITEM TRACKING****INITIATE ACTION ITEM**

INDIVIDUAL ASSIGNED TO ACTION \_\_\_\_\_ DEPARTMENT \_\_\_\_\_

ACTION REQUIRED \_\_\_\_\_

DUE DATE \_\_\_\_\_ ACTION ITEM LOG NUMBER \_\_\_\_\_

**CLOSE ACTION ITEM**

ACTION ITEM LOG NUMBER \_\_\_\_\_ INITITATING DOCUMENT DIN \_\_\_\_\_

COMPLETION DATE \_\_\_\_\_ APPROVAL \_\_\_\_\_

COMMENTS \_\_\_\_\_

DISTRIBUTION	ATTACH W W/O	APPRVL. ROUTE ORDER INITIAL	DISTRIBUTION	ATTACH W W/O	APPRVL. ROUTE ORDER INITIAL	DISTRIBUTION	ATTACH W W/O
STOLLER CORP.						<b>DOE</b>	
S.M. MARUTZKY						P.S. THOMPSON	
R.C. CATO	✓	1 <i>RCE</i>				T.C. PAULING	✓
Y.E. DEYO							
W.L. DRNEC							
E.M. HEUER							
M.G. LUTZ	✓						
M.L. OAKS							
S.E. RICHARDSON							
J.R. THOMPSON							
T.R. UHLMAYER							
GJO							
M.C. BOTHERUS							
CORRESPONDENCE FILE							
ORIGINATOR:							



established 1959

**Memorandum**

**DATE:** January 20, 2004

**TO:** File

**FROM:** Rebecca Cato

*RC*  
*1/20/04*

**SUBJECT:** Cost Estimates for Final Alternatives presented in the Supporting Evaluation for the Proposed Plan for the Final Remedial Action for the GWOU

The final alternatives reevaluated in the supporting evaluation were:

1. No Action
2. Groundwater Removal and Treatment
3. In Situ Chemical Oxidation of TCE
4. Monitored Natural Attenuation
5. Long-Term Monitoring

The cost estimates used in the Supporting Evaluation for the Proposed Plan are outlined below.

**No Action**

Costs associated with the no action alternative would include abandonment of the existing monitoring wells network (79 wells) and engineering/oversight costs, which are assumed to be 15% of the subcontract costs. Cost breakdowns are presented in Attachment 1.

<b>Capital Costs</b> Costs include abandonment of wells. Engineering and oversight costs are also included.	\$ 522,000
<b>Operations and Maintenance Costs (annual cost)</b> Costs include operation of the treatment facility, general expenses, analytical costs, and material disposal. Engineering and oversight costs are also included.	\$ 0

## Groundwater Removal

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To provide the costs needed for comparing this technology with other being considered, estimates were developed by using best engineering judgement and information from the additional groundwater field studies. The estimates assume that artificial recharge would be utilized. The estimates shown are for a preliminary groundwater removal system and for costing purposes only. Assumptions regarding installation of about 28 extraction and 38 injection wells were based on a reasonable radius of influence estimated from the additional groundwater field studies. Cost breakdowns are presented in Attachment 2.

<b>Capital Costs</b> Costs include installation of wells and necessary equipment, piping, and construction of a treatment facility. Engineering and oversight costs are also included.	\$ 5,170,000
<b>Operations and Maintenance Costs (annual cost)</b> Costs include operation of the treatment facility, general expenses, analytical costs, and material disposal. Engineering and oversight costs are also included.	\$ 2,150,000

## In Situ Chemical Oxidation

A preliminary estimate for a larger-scale effort intended to treat the entire plume was submitted by the specialty subcontractor who performed the pilot-phase project at the site. The subcontractor indicated that the capital cost would be great than \$9 million. A more definitive cost could not be estimated due to uncertainties that would need to be taken into account, such as rebound and non-uniform distribution of oxidant.

Additional costs would be associated with the remainder of the contaminants of concern (nitrate, uranium, and nitroaromatic compounds). Costs would be similar to the other alternatives presented below.

## Monitored Natural Attenuation

Groundwater and springs would be monitored at the chemical plant site until MCLs are attained. It is estimated that this will occur within a period of approximately 100 years. It is assumed that 2 wells (1 in the weathered zone and the other in the unweathered zone) would be installed to augment the existing monitoring network and 41 existing wells that will not be included in the monitoring network would be abandoned. Cost breakdowns are presented in Attachment 3.

~~==~~ 94355

<b>Capital Costs</b> Costs include installation and abandonment of wells. Engineering and oversight costs are also included (15% of subcontractor costs).	\$ 540,000
<b>Operations and Maintenance Costs (annual cost)</b> Costs include analytical costs and well replacement costs. Engineering and oversight costs (15% of subcontractor costs) and contingency (10%) are included.	\$ 345,000

### Long-Term Monitoring

Groundwater and springs would be monitored at the chemical plant site to ensure that necessary steps are taken to prevent or minimize exposure to contaminants. It is assumed that a minimal monitoring network would be in place, approximately 19 wells and the remainder of the existing monitoring network would be abandoned. Cost breakdowns are presented in Attachment 4.

<b>Capital Costs</b> Costs include abandonment of wells. Engineering and oversight costs are also included (15% of subcontractor costs).	\$ 450,000
<b>Operations and Maintenance Costs (annual cost)</b> Costs include analytical costs and well replacement costs. Engineering and oversight costs (15% of subcontractor costs) and contingency (10%) are included.	\$ 160,000

### ATTACHMENT: (4)

**Distribution:** Administrative Record File for the GWOU

**Attachment 1**

**Cost Breakdown for No Action Alternative**

**Table #2: Groundwater Operable Unit - No Action Alternative Costs**

Task Description: Abandon existing DOE wells (79)

Item	Item Description	Quantity	Unit	Rate	Cost
5	Geologist	0.0	mhr	\$110.00	\$0.00
7	Rock Coring w/ Cont. Sampling	0.0	lf	\$80.00	\$0.00
8	Soil Drilling	0.0	lf	\$20.00	\$0.00
9	Shelby Tube Sampling	0.0	ea	\$35.00	\$0.00
10	Split Spoon Sampling	0.0	ea	\$30.00	\$0.00
11	Continuous Sampling	0.0	lf	\$15.00	\$0.00
12	Collect & Transport Samples	0.0	chr	\$150.00	\$0.00
13	Bentonite Grout- Installation	0.0	lf	\$15.00	\$0.00
14	Sand- Installation	0.0	lf	\$15.00	\$0.00
15	Bentonite Pellets- Installation	0.0	lf	\$40.00	\$0.00
16	2" SS Screen	0.0	lf	\$45.00	\$0.00
17	2" SS Casing	0.0	lf	\$30.00	\$0.00
18	2" SS Plug	0.0	ea	\$40.00	\$0.00
19	2" SS Cap	0.0	ea	\$40.00	\$0.00
20	2" PVC Screen	0.0	lf	\$15.00	\$0.00
21	2" PVQ Casing	0.0	lf	\$8.00	\$0.00
22	2" PVC Plug	0.0	ea	\$20.00	\$0.00
23	2" PVC Cap	0.0	ea	\$20.00	\$0.00
24	Well Development	0.0	ea	\$2,200.00	\$0.00
25	Packer Testing	0.0	chr	\$240.00	\$0.00
26	6" Rock Reaming	0.0	lf	\$70.00	\$0.00
27	Well Protection	0.0	ea	\$750.00	\$0.00
30	4" Boring Abandonment	0.0	lf	\$40.00	\$0.00
31	6" Boring Abandonment	0.0	lf	\$50.00	\$0.00
36	Neat Cement Grout- Abandonment	0.0	lf	\$25.00	\$0.00
37	Bentonite Grout- Abandonment 4" Hole	0.0	lf	\$25.00	\$0.00
38	4" Cutter	0.0	ea	\$3,500.00	\$0.00
39	6" Cutter	0.0	ea	\$7,500.00	\$0.00
40	10" Cutter	0.0	ea	\$9,500.00	\$0.00
41	Well Registration	0.0	ea	\$60.00	\$0.00
47	Monitoring Well Repair & Retrofit Labor	0.0	hr	\$220.00	\$0.00
				<b>\$454,182.50</b>	

**Comments:**

Rates based on Layne-Christensen WP-563 Bid costs

- 1 Subcontractor has increased pricing based on GWOU rock coring experience @ WSSRAP (see attached letter dated 10/15/01)
- 2 Subcontractor has increased pricing based on experience @ WSSRAP and having to provide access for the air rotary rig w/ no assistance from others
- 3 Subcontractor is entirely responsible for providing access to the drilling location, which includes mobilization and set-up of various additional equipment

**Attachment 2**

**Cost Breakdown for Groundwater Removal Alternative**





Project GWOM - PP  
Feature P&TW/Injection Costs  
Item \_\_\_\_\_

Contract No. 3589  
Designed \_\_\_\_\_  
Checked \_\_\_\_\_

Sheet 1/2  
File No. \_\_\_\_\_  
Date \_\_\_\_\_  
Date \_\_\_\_\_

### CAPITAL COSTS.

- ① EXTRACTION & INJECTION  
WELL INSTALLATION  
(SEE ATTACHED) \$1,515,175
- ② PUMPS 28 \* \$3500 \$ 98,000
- ③ PIPING (HDPE)  
10000 FT \* \$38/FT  
includes mat'l + labor \$ 380,000
- ④ TREATMENT FACILITY  
CIAC + ION EXCHANGE  
EMERGENCY STORAGE  
OF WATER (0.15M)  
SITE PREP (0.15M)  
CONNECTION TO DISCHARGE  
(IF NECESSARY)  
CONNECTION TO INJ PTS \$2,5100,000
- ⑤ ENGINEERING + OVERSIGHT (15%) \$ 673976

### OPERATIONS COSTS

TOTAL

\$5,167,151

- ① SYSTEM OPERATIONS  
2X GWOM FIELD STUDY COSTS. \$907,586
- ② GENERAL EXPENSES  
CHEMICALS  
SUPPLIES  
ANALYTICAL FOR DISCHARGE  
REPLACEMENT PUMPS \$805,968
- ③ DISPOSAL / MAT'L TO ENVIRONMENT \$5,000



MORRISON KNUDSEN CORPORATION

MK-FERGUSON GROUP

CALCULATION SHEET

ENG-9s.1, REV.0, 9/92

Project GNON - PP  
Feature PAT W/ INJECTION COSTS  
Item \_\_\_\_\_

Contract No. 3589  
Designed \_\_\_\_\_  
Checked \_\_\_\_\_

Sheet 2/2  
File No. \_\_\_\_\_  
Date \_\_\_\_\_  
Date \_\_\_\_\_

④ GW MONITORING (A60% MNA)

	ICE	NO <sub>3</sub>	U	TNT
# SAMPLES	10	10	5	12
FREQUENCY/YR	2	2	2	2
\$	\$110	\$25	\$60	\$120
QC	10%	10%	10%	10%
SUBTOTAL	\$2420	\$550	\$660	\$3168

A \$6793

SUPPLIES/  
SHIPPING

B + \$680

LABOR

C + \$84,000

TOTAL

A+B+C

\$91,478

⑤ ROUTINE  
WELL MAINTENANCE

\$50,000

⑥ OVERRIGHT 5%

\$93,000

⑦ CONTINGENCY 10%

\$195,303

\$2,148,335

**Table #6: Groundwater Operable Unit - Pump and Treat w/Injection Alternative**

Task Description: Installation of 28 extraction and 38 Injection wells

Weathered well assumed to be 60 ft deep (30 ft OB and 30 Rock) - Soil sampling and packer testing

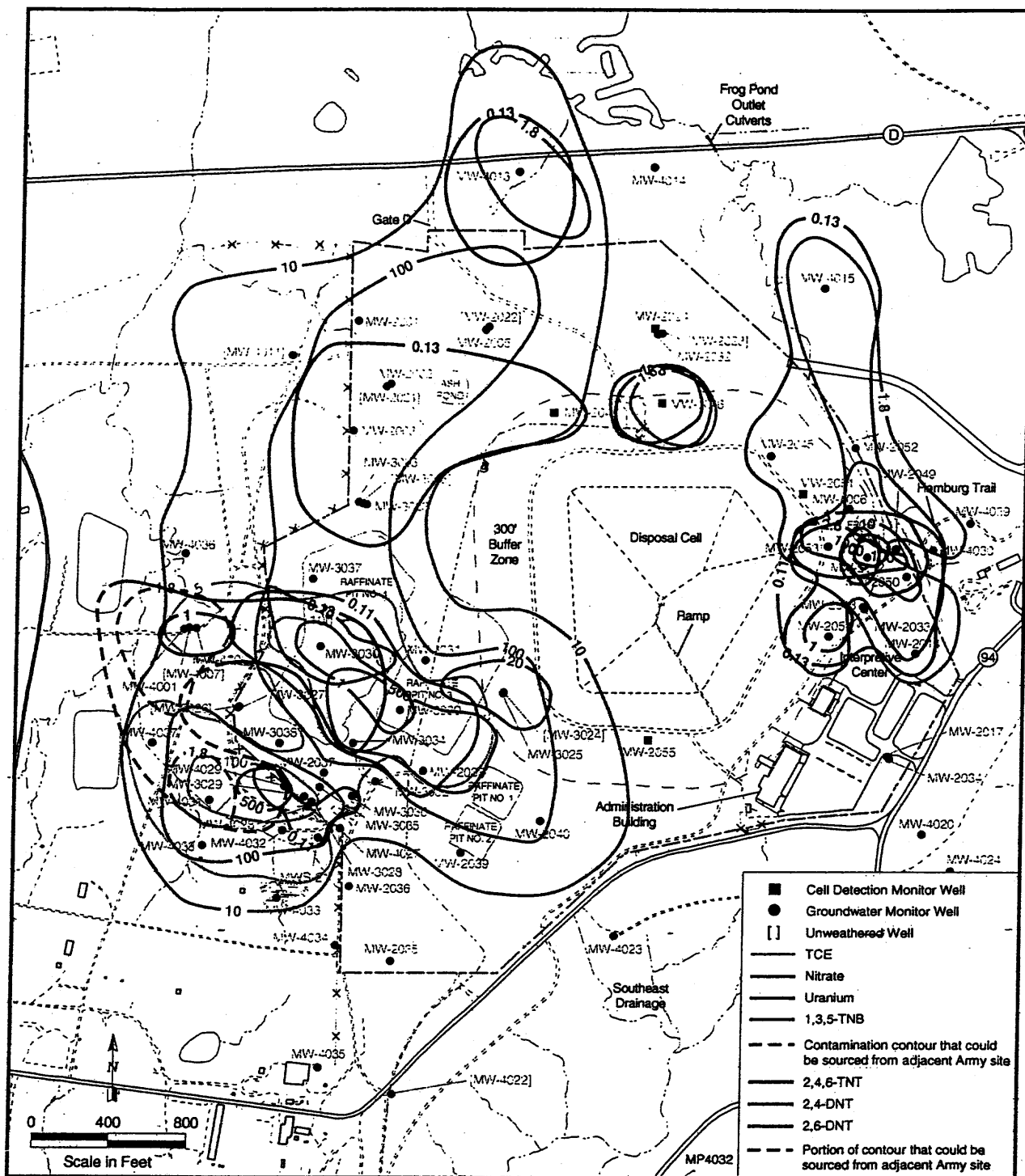
Assume SS construction and 6-inch diameter well material for extraction wells and 2-inch for Injection wells (20-ft screen)

Item	Item Description	Quantity	Unit	Rate	Cost
5	Geologist	0.0	mhr	\$110.00	\$0.00
9	Shelby Tube Sampling	0.0	ea	\$35.00	\$0.00
11	Continuous Sampling	0.0	lf	\$15.00	\$0.00
12	Collect & Transport Samples	0.0	chr	\$150.00	\$0.00
19	2" SS Cap	0.0	ea	\$40.00	\$0.00
20	2" PVC Screen	0.0	lf	\$15.00	\$0.00
21	2" PVC Casing	0.0	lf	\$8.00	\$0.00
22	2" PVC Plug	0.0	ea	\$20.00	\$0.00
23	2" PVC Cap	0.0	ea	\$20.00	\$0.00
28	Well Certification (Abandonments)	0.0	ea	\$60.00	\$0.00
30	4" Boring Abandonment	0.0	lf	\$40.00	\$0.00
31	6" Boring Abandonment	0.0	lf	\$50.00	\$0.00
32	10" Boring Abandonment	30.0	lf	\$95.00	\$2,850.00
33	14" Boring Abandonment	0.0	lf	\$160.00	\$0.00
34	6" Rotary Wash- Abandonment	30.0	lf	\$60.00	\$1,800.00
35	8" Rotary Wash- Abandonment	0.0	lf	\$80.00	\$0.00
36	Neat Cement Grout- Abandonment	0.0	lf	\$25.00	\$0.00
37	Bentonite Grout- Abandonment 4" Hole	0.0	lf	\$25.00	\$0.00
38	4" Cutter	0.0	ea	\$3,500.00	\$0.00
39	6" Cutter	0.0	ea	\$7,500.00	\$0.00
40	10" Cutter	0.0	ea	\$9,500.00	\$0.00
41	Well Registration	1.0	ea	\$60.00	\$60.00
42	Bentonite Grout- Abandonment 6" Hole	30.0	lf	\$20.00	\$600.00
43	Bentonite Grout- Abandonment 8" Hole	0.0	lf	\$30.00	\$0.00
44	Bentonite Grout- Abandonment 10" Hole	30.0	lf	\$45.00	\$1,350.00
45	Bentonite Grout- Abandonment 14" Hole	0.0	lf	\$75.00	\$0.00
47	Monitoring Well Repair & Retrofit Labor	0.0	hr	\$220.00	\$0.00
50	Access and Site Preparation	0.0	hr	\$200.00	\$0.00
					\$1,515,175.00

**Comments:**

Rates based on Layne-Christensen WP-563 Bid costs

- 1 Subcontractor has increased pricing based on GWOU rock coring experience @ WSSRAP (see attached letter dated 10/15/01)
- 2 Subcontractor has increased pricing based on experience @ WSSRAP and having to provide access for the air rotary rig w/ no assistance from others
- 3 Subcontractor is entirely responsible for providing access to the drilling location, which includes mobilization and set-up of various additional equipment



LABOR COST  
CHEM COSTS

EQUIPMENT  
TANKS  
PIPING

$$\Delta t = \frac{\text{# pore volumes} \times R \ln \frac{C_0}{C_{th}} \times \text{pore volume} \times \phi}{n Q \times \text{# wells}}$$

porosity

extraction rate.

Zone 1

ASSUME 20 PORE VOLUMES TO CLEAN UP

$$\Delta t = \frac{(20) (1.6 \times 10^9 \text{ gal}) (0.3)}{10 (10 \text{ g/min})} = 9.6 \times 10^7 \text{ min}$$

$9.6 \times 10^9$   
 $4.4 \times 10^7$

15 wells = 122 yrs  
\* 18 wells = 601 yrs

$$\Delta t = 365 \text{ yrs @ } 5 \text{ gpm.}$$

Average over area.

at 10 gpm 182 yrs

For all but  
Uran.

Zone 2

$$2,4\text{-DNT } \#PV = 4.6 \ln \frac{1800}{0.11} = 45$$

$$2,4\text{-DNT } \#PV = 8.3 \ln \frac{1500}{0.13} = 77.6$$

ASSUME 50  
PORE VOLS TO  
CLEAN UP.

$$\Delta t = \frac{50 (3.7 \times 10^8) \text{ gal} (0.3)}{6 (10 \text{ gpm})} = 9.25 \times 10^7 \text{ min}$$

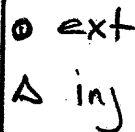
$5.55 \times 10^9$

176 yrs.

12 wells = 88 yrs

\* 10 wells = 106 yrs

377,520,000 gal



ZONE 1	ZONE 2
18 ext	10 ext
24 inj	14 inj

PORE VOLUMES

$$\left[ (5.5 \times 800) + (1.0 \times 800) \times 21.5 \right] \times 70\%$$
$$21,190,400 \times \frac{7.5 \text{ g/cc}}{\text{CF}} = 1.6 \times 10^9 \text{ cc}$$



Project GWOU - PP COST  
Feature P&T Alternative  
Item Costs

Contract No. 3589  
Designed \_\_\_\_\_  
Checked \_\_\_\_\_

Sheet \_\_\_\_\_  
File No. \_\_\_\_\_  
Date \_\_\_\_\_  
Date \_\_\_\_\_

P&TW/ Re-injection

① ~~DRILLING~~ (C)

28 EXTRACTION WELLS  
38 INJECTION WELLS

ASSUME 30' OVERBURDEN } DRILLED THRU W UNIT  
30' ROCK  
20' SS SCREENS  
6" - INCH DIAMETER EXTRACTION WELLS  
2" - INCH DIAMETER INJECTION WELLS

SEE ATTACHED SPREADSHEET

~~Pumps~~ \$3500 \* 28 wells = \$98,000

② SYSTEM OPERATIONS (A)

USE EARTHTECH COSTS FOR GWOM FIELD STUDY

\$453,793 / 6 MONTHS

③ GENERAL EXPENSE (A)

CHEMICALS }  
SUPPLIES }  
ANALYTICAL FOR }  
RE-INJECT OR }  
DISCHARGE / PUMPS }  
CONTINUOUS }  
USE P&T GEN EXP -  
\$250K FOR ANALYTICAL  
\$805,768 / yr

④ CONSTRUCTION (C)

TREATMENT FACILITY / USED FS COSTS  
SITE PREP  
PIPING 38/ft metal / labor 7500ft - \$285,000  
EST \$2M  
DROW  
\$476,902

⑤ DISPOSAL \$150/yr

**Attachment 3**

**Cost Breakdown for Monitored Natural Attenuation Alternative**



Project GWON-PP  
Feature MNA Costs  
Item \_\_\_\_\_

Contract No. 3589  
Designed \_\_\_\_\_  
Checked \_\_\_\_\_

Sheet 1/2  
File No. \_\_\_\_\_  
Date \_\_\_\_\_  
Date \_\_\_\_\_

### CAPITAL COSTS

INSTALLATION (1 W & 1 UW)  
(See Table 1) \$184,010

ABANDONMENT (41 existing wells)  
(See Table 4) \$285,142

ENGINEERING / OVERSIGHT (15%) 70,373

\$539,525

### OPERATIONS / MAINTENANCE

Analytical	<u>TCE</u>	<u>NO3</u>	<u>U</u>	<u>Nitros</u>
#	17	17	11	21
FREQ/yr*	2	2	2	2
\$	\$10	\$25	\$60	\$120
QC	10%	10%	10%	10%
TOTAL	\$4114	\$935	\$1452	\$5544

ANALYTICAL TOTAL \$12,045

SUPPLIES / SHIPPING (10%) \$1,205

LABOR (existing contract costs) \$160,000

\* frequency / yr - average of all Q, S, A locations



MORRISON KNUDSEN CORPORATION

MK-FERGUSON GROUP

CALCULATION SHEET

ENG-9s.1, REV.0, 9/92

Project GUZON - PP  
Feature MNA Costs  
Item \_\_\_\_\_

Contract No. 3589  
Designed \_\_\_\_\_  
Checked \_\_\_\_\_

Sheet 2/2  
File No. \_\_\_\_\_  
Date \_\_\_\_\_  
Date \_\_\_\_\_

WELL MAINTENANCE / REPLACEMENT

1 INSTALL / 1 ABANDON PER YEAR  
(SEE TABLE #5)

42,945

OVERSIGHT (15%) \$32,429

CONTINGENCY (10%) \$24,862

ANNUAL INSPECTION & REPORTING \$70,000

\* Cost based on 1/3 costs for project LTRM costs

OTM TOTAL \$343,486

**Table #1: Groundwater Operable Unit - W & UW Well Installation Costs**

**Task Description:** Installation of 1 weathered and 1 unweathered well (including drilling of three borings)

**Weathered well to be optimally located by drilling three borings and selecting the best one for well installation**

**All borings will be packer tested throughout the bedrock portion**

Item	Item Description	Quantity	Unit	Rate	Cost
1	Mobilization	1.0	ea	\$184,010.00	\$184,010.00
2	Shelby Tube	1.0	ea	\$35.00	\$35.00
3	Shelby Tube Sampling	1.0	ea	\$35.00	\$35.00
4	Continuous Sampling	1.0	lf	\$15.00	\$15.00
5	Geologist	0.0	mhr	\$110.00	\$0.00
6	2" SS Plug	1.0	ea	\$20.00	\$20.00
7	2" PVC Casing	1.0	lf	\$8.00	\$8.00
8	2" PVC Screen	1.0	lf	\$15.00	\$15.00
9	Shelby Tube Sampling	0.0	ea	\$35.00	\$0.00
10	Continuous Sampling	0.0	lf	\$15.00	\$0.00
11	Continuous Sampling	0.0	lf	\$15.00	\$0.00
12	Collect & Transport Samples	0.0	chr	\$150.00	\$0.00
13	2" SS Plug	1.0	ea	\$20.00	\$20.00
14	2" PVC Casing	1.0	lf	\$8.00	\$8.00
15	2" PVC Screen	1.0	lf	\$15.00	\$15.00
16	2" SS Plug	1.0	ea	\$20.00	\$20.00
17	2" PVC Casing	1.0	lf	\$8.00	\$8.00
18	2" PVC Screen	1.0	lf	\$15.00	\$15.00
19	2" SS Cap	0.0	ea	\$40.00	\$0.00
20	2" PVC Screen	0.0	lf	\$15.00	\$0.00
21	2" PVC Casing	0.0	lf	\$8.00	\$0.00
22	2" PVC Plug	0.0	ea	\$20.00	\$0.00
23	2" PVC Cap	0.0	ea	\$20.00	\$0.00
24	Well Development	0.0	ea	\$2,200.00	\$0.00
25	Packer Testing	0.0	chr	\$240.00	\$0.00
26	2" SS Plug	1.0	ea	\$20.00	\$20.00
27	2" PVC Casing	1.0	lf	\$8.00	\$8.00
28	2" PVC Screen	1.0	lf	\$15.00	\$15.00
29	2" SS Plug	1.0	ea	\$20.00	\$20.00
30	4" Boring Abandonment	0.0	lf	\$40.00	\$0.00
31	10" Boring Abandonment	0.0	lf	\$95.00	\$0.00
32	10" Boring Abandonment	0.0	lf	\$95.00	\$0.00
33	14" Boring Abandonment	0.0	lf	\$160.00	\$0.00
34	6" Rotary Wash- Abandonment	0.0	lf	\$60.00	\$0.00
35	8" Rotary Wash- Abandonment	0.0	lf	\$80.00	\$0.00
36	Neat Cement Grout- Abandonment	0.0	lf	\$25.00	\$0.00
37	Bentonite Grout- Abandonment 6" Hole	0.0	lf	\$20.00	\$0.00
38	4" Cutter	0.0	ea	\$3,500.00	\$0.00
39	6" Cutter	0.0	ea	\$7,500.00	\$0.00
40	10" Cutter	0.0	ea	\$9,500.00	\$0.00
41	Well Rehabilitation	0.0	ea	\$120.00	\$0.00
42	Bentonite Grout- Abandonment 6" Hole	0.0	lf	\$20.00	\$0.00
43	Bentonite Grout- Abandonment 8" Hole	0.0	lf	\$30.00	\$0.00
44	Bentonite Grout- Abandonment 10" Hole	0.0	lf	\$45.00	\$0.00
45	Bentonite Grout- Abandonment 14" Hole	0.0	lf	\$75.00	\$0.00
46	Well Rehabilitation	0.0	ea	\$120.00	\$0.00
47	Monitoring Well Repair & Retrofit Labor	0.0	hr	\$220.00	\$0.00
50	Access and Site Preparation	0.0	hr	\$200.00	\$0.00
					<b>\$184,010.00</b>

**Comments:**

Rates based on Layne-Christensen WP-563 Bid costs

- 1 Subcontractor has increased pricing based on GWOU rock coring experience @ WSSRAP (see attached letter dated 10/15/01)
- 2 Subcontractor has increased pricing based on experience @ WSSRAP and having to provide access for the air rotary rig w/ no assistance from others
- 3 Subcontractor is entirely responsible for providing access to the drilling location, which includes mobilization and set-up of various additional equipment

**Table #4: Groundwater Operable Unit - MNA Alternative Costs**

Task Description: Abandon existing DOE wells 41

Also include costs from Table #1 for new well installation

Item	Item Description	Quantity	Unit	Rate	Cost
1	Subcontractor Mobilization	1.0	ea	\$250.00	\$250.00
2	Subcontractor Demobilization	1.0	ea	\$250.00	\$250.00
3	Subcontractor Insurance	1.0	ea	\$250.00	\$250.00
4	Subcontractor Bond	1.0	ea	\$250.00	\$250.00
5	Geologist	0.0	mhr	\$110.00	\$0.00
6	Rock Coring w/ Cont. Sampling	0.0	lf	\$80.00	\$0.00
7	Rock Coring w/ Cont. Sampling	0.0	lf	\$80.00	\$0.00
8	Soil Drilling	0.0	lf	\$20.00	\$0.00
9	Shelby Tube Sampling	0.0	ea	\$35.00	\$0.00
10	Split Spoon Sampling	0.0	ea	\$30.00	\$0.00
11	Continuous Sampling	0.0	lf	\$15.00	\$0.00
12	Collect & Transport Samples	0.0	chr	\$150.00	\$0.00
13	Bentonite Grout- Installation	0.0	lf	\$15.00	\$0.00
14	Sand- Installation	0.0	lf	\$15.00	\$0.00
15	Bentonite Pellets- Installation	0.0	lf	\$40.00	\$0.00
16	2" SS Screen	0.0	lf	\$45.00	\$0.00
17	2" SS Casing	0.0	lf	\$30.00	\$0.00
18	2" SS Plug	0.0	ea	\$40.00	\$0.00
19	2" SS Cap	0.0	ea	\$40.00	\$0.00
20	2" PVC Screen	0.0	lf	\$15.00	\$0.00
21	2" PVC Casing	0.0	lf	\$8.00	\$0.00
22	2" PVC Plug	0.0	ea	\$20.00	\$0.00
23	2" PVC Cap	0.0	ea	\$20.00	\$0.00
24	Well Development	0.0	ea	\$2,200.00	\$0.00
25	Packer Testing	0.0	chr	\$240.00	\$0.00
26	6" Rock Reaming	0.0	lf	\$70.00	\$0.00
27	Well Protection	0.0	ea	\$750.00	\$0.00
28	Well Abandonment 4" Boring	0.0	lf	\$40.00	\$0.00
29	Well Abandonment 6" Boring	0.0	lf	\$50.00	\$0.00
30	4" Boring Abandonment	0.0	lf	\$40.00	\$0.00
31	6" Boring Abandonment	0.0	lf	\$50.00	\$0.00
32	10" Boring Abandonment	0.0	lf	\$95.00	\$0.00
33	12" Boring Abandonment	0.0	lf	\$100.00	\$0.00
34	14" Boring Abandonment	0.0	lf	\$110.00	\$0.00
35	16" Boring Abandonment	0.0	lf	\$120.00	\$0.00
36	Neat Cement Grout- Abandonment	0.0	lf	\$25.00	\$0.00
37	Bentonite Grout- Abandonment 4" Hole	0.0	lf	\$25.00	\$0.00
38	4" Cutter	0.0	ea	\$3,500.00	\$0.00
39	6" Cutter	0.0	ea	\$7,500.00	\$0.00
40	10" Cutter	0.0	ea	\$9,500.00	\$0.00
41	Well Registration	0.0	ea	\$60.00	\$0.00
42	Well Abandonment 4" Boring	0.0	lf	\$40.00	\$0.00
43	Well Abandonment 6" Boring	0.0	lf	\$50.00	\$0.00
44	Well Abandonment 10" Boring	0.0	lf	\$95.00	\$0.00
45	Well Abandonment 12" Boring	0.0	lf	\$100.00	\$0.00
46	Well Abandonment 14" Boring	0.0	lf	\$110.00	\$0.00
47	Monitoring Well Repair & Retrofit Labor	0.0	hr	\$220.00	\$0.00
48	Well Abandonment 16" Boring	0.0	lf	\$120.00	\$0.00
					<b>\$285,142.50</b>

**Comments:**

Rates based on Layne-Christensen WP-563 Bid costs

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- 2 Subcontractor has increased pricing based on experience @ WSSRAP and having to provide access for the air rotary rig w/ no assistance from others
- 3 Subcontractor is entirely responsible for providing access to the drilling location, which includes mobilization and set-up of various additional equipment

**Table #5: Groundwater Operable Unit - Abandonment-Installation Costs for 1 Well**

**Task Description:** Abandonment and installation of 1 weathered well for annual maintenance costs

Assume new well to be installed as original (abandoned) well.

Weathered well assumed to be 60 ft deep and no testing performed

Item	Item Description	Quantity	Unit	Rate	Cost
1	Geologist	0.0	hr	\$110.00	\$0.00
2	Shelby Tube	0.0	ea	\$35.00	\$0.00
3	Split Spoon Sampling	0.0	ea	\$30.00	\$0.00
4	Continuous Sampling	0.0	lf	\$15.00	\$0.00
5	Collect & Transport Samples	0.0	chr	\$150.00	\$0.00
6	2" SS Cap	0.0	ea	\$40.00	\$0.00
7	2" PVC Screen	0.0	lf	\$15.00	\$0.00
8	2" PVC Casing	0.0	lf	\$8.00	\$0.00
9	2" PVC Plug	0.0	ea	\$20.00	\$0.00
10	2" PVC Cap	0.0	ea	\$20.00	\$0.00
11	Well Development	0.0	ea	\$2,200.00	\$0.00
12	Packer Testing	0.0	chr	\$240.00	\$0.00
13	4" Boring Abandonment	0.0	lf	\$40.00	\$0.00
14	6" Boring Abandonment	0.0	lf	\$50.00	\$0.00
15	10" Boring Abandonment	0.0	lf	\$160.00	\$0.00
16	14" Boring Abandonment	0.0	lf	\$160.00	\$0.00
17	8" Rotary Wash- Abandonment	0.0	lf	\$80.00	\$0.00
18	Neat Cement Grout- Abandonment	0.0	lf	\$25.00	\$0.00
19	Bentonite Grout- Abandonment 4" Hole	0.0	lf	\$25.00	\$0.00
20	4" Cutter	0.0	ea	\$3,500.00	\$0.00
21	6" Cutter	0.0	ea	\$7,500.00	\$0.00
22	10" Cutter	0.0	ea	\$9,500.00	\$0.00
23	Bentonite Grout- Abandonment 8" Hole	0.0	lf	\$30.00	\$0.00
24	Bentonite Grout- Abandonment 10" Hole	0.0	lf	\$45.00	\$0.00
25	Bentonite Grout- Abandonment 14" Hole	0.0	lf	\$75.00	\$0.00
26	Monitoring Well Repair & Retrofit Labor	0.0	hr	\$220.00	\$0.00
27	Access and Site Preparation	0.0	hr	\$200.00	\$0.00
					<b>\$42,945.00</b>

**Comments:**

Rates based on Layne-Christensen WP-563 Bid costs

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- 3 Subcontractor is entirely responsible for providing access to the drilling location, which includes mobilization and set-up of various additional equipment

**Attachment 4**

**Cost Breakdown for Long Term Monitoring Alternative**

Project GWOU-PP  
Feature Long-Term Monitoring Costs  
Item \_\_\_\_\_

Contract No. 3589  
Designed \_\_\_\_\_  
Checked \_\_\_\_\_

Sheet 1/2  
File No. \_\_\_\_\_  
Date \_\_\_\_\_  
Date \_\_\_\_\_

### CAPITAL COSTS

Abandonment of 60 existing wells  
(See Table 3)

\$386,532

Engineering + Oversight (15%)

57,980

\$444,512

### OPERATIONS / MAINTENANCE

Analytical

TCE

NO<sub>3</sub>

U

TRIT

#

9

9

6

11

FREQ/YR

1

1

1

1

\$

\$110

\$25

\$60

\$120

QC

10%

10%

10%

10%

TOTALS

\$1089

\$248

\$396

\$1452

TOTAL ANALYTICAL \$3185

SUPPLIES/SHIPPING (10%) \$318

LABOR (1/4 existing contract) \$40,000

WELL MAINTENANCE/REPLACEMENT \$25,767  
(60% MNA COSTS)

ENGINEERING / OVERSIGHT (15%) \$10,390

CONTINGENCY (10%) \$7,964



MORRISON KNUDSEN CORPORATION  
MK-FERGUSON GROUP

CALCULATION SHEET  
ENG-9s.1, REV.0, 9/92

Project GWON - PP  
Feature Long Term Mon. Costs  
Item \_\_\_\_\_

Contract No. 3589  
Designed \_\_\_\_\_  
Checked \_\_\_\_\_

Sheet 2/2  
File No. \_\_\_\_\_  
Date \_\_\_\_\_  
Date \_\_\_\_\_

ANNUAL INSPECTION \$70,000  
REPORTING  
(13 COSTS FOR PROJECT LTRM COSTS)

GRM TOTAL \$157,424



**Table #3: Groundwater Operable Unit - Long-Term Monitoring Alternative Costs**

**Task Description: Abandon existing DOE wells (60)**

**Assume removal of all unweathered wells**

Item	Item Description	Quantity	Unit	Rate	Cost
1	Mobilization	1.0	ea	\$2,100.00	\$2,100.00
2	Shelby Tube	1.0	ea	\$250.00	\$250.00
3	Split Spoon Sampling	1.0	ea	\$30.00	\$30.00
4	Continuous Sampling	1.0	lf	\$15.00	\$15.00
5	Geologist	0.0	mhr	\$110.00	\$0.00
6	Rock Coring w/ Cont. Sampling	0.0	lf	\$80.00	\$0.00
7	Soil Drilling	0.0	lf	\$20.00	\$0.00
8	Shelby Tube Sampling	0.0	ea	\$35.00	\$0.00
9	Split Spoon Sampling	0.0	ea	\$30.00	\$0.00
10	Continuous Sampling	0.0	lf	\$15.00	\$0.00
11	Collect & Transport Samples	0.0	chr	\$150.00	\$0.00
12	Bentonite Grout- Installation	0.0	lf	\$15.00	\$0.00
13	Sand- Installation	0.0	lf	\$15.00	\$0.00
14	Bentonite Pellets- Installation	0.0	lf	\$40.00	\$0.00
15	2" SS Screen	0.0	lf	\$45.00	\$0.00
16	2" SS Casing	0.0	lf	\$30.00	\$0.00
17	2" SS Plug	0.0	ea	\$40.00	\$0.00
18	2" SS Cap	0.0	ea	\$40.00	\$0.00
19	2" PVC Screen	0.0	lf	\$15.00	\$0.00
20	2" PVC Casing	0.0	lf	\$8.00	\$0.00
21	2" PVC Plug	0.0	ea	\$20.00	\$0.00
22	2" PVC Cap	0.0	ea	\$20.00	\$0.00
23	Well Development	0.0	ea	\$2,200.00	\$0.00
24	Packer Testing	0.0	chr	\$240.00	\$0.00
25	6" Rock Reaming	0.0	lf	\$70.00	\$0.00
26	Well Protection	0.0	ea	\$750.00	\$0.00
27	Well Abandonment 4" Hole	0.0	lf	\$40.00	\$0.00
28	Well Abandonment 6" Hole	0.0	lf	\$50.00	\$0.00
29	Well Abandonment 10" Hole	0.0	lf	\$9,500.00	\$0.00
30	4" Boring Abandonment	0.0	lf	\$40.00	\$0.00
31	6" Boring Abandonment	0.0	lf	\$50.00	\$0.00
32	10" Boring Abandonment	0.0	lf	\$9,500.00	\$0.00
33	Neat Cement Grout- Abandonment	0.0	lf	\$25.00	\$0.00
34	Bentonite Grout- Abandonment 4" Hole	0.0	lf	\$25.00	\$0.00
35	4" Cutter	0.0	ea	\$3,500.00	\$0.00
36	6" Cutter	0.0	ea	\$7,500.00	\$0.00
37	10" Cutter	0.0	ea	\$9,500.00	\$0.00
38	Well Registration	0.0	ea	\$60.00	\$0.00
39	Bentonite Grout- Abandonment 4" Hole	0.0	lf	\$25.00	\$0.00
40	Bentonite Grout- Abandonment 6" Hole	0.0	lf	\$25.00	\$0.00
41	Bentonite Grout- Abandonment 10" Hole	0.0	lf	\$25.00	\$0.00
42	Well Abandonment 4" Hole	0.0	lf	\$40.00	\$0.00
43	Well Abandonment 6" Hole	0.0	lf	\$50.00	\$0.00
44	Well Abandonment 10" Hole	0.0	lf	\$9,500.00	\$0.00
45	Monitoring Well Repair & Retrofit Labor	0.0	hr	\$220.00	\$0.00
46	Access and Setup	1.0	ea	\$2,100.00	\$2,100.00
					<b>\$388,532.50</b>

**Comments:**

*Rates based on Layne-Christensen WP-563 Bid costs*

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